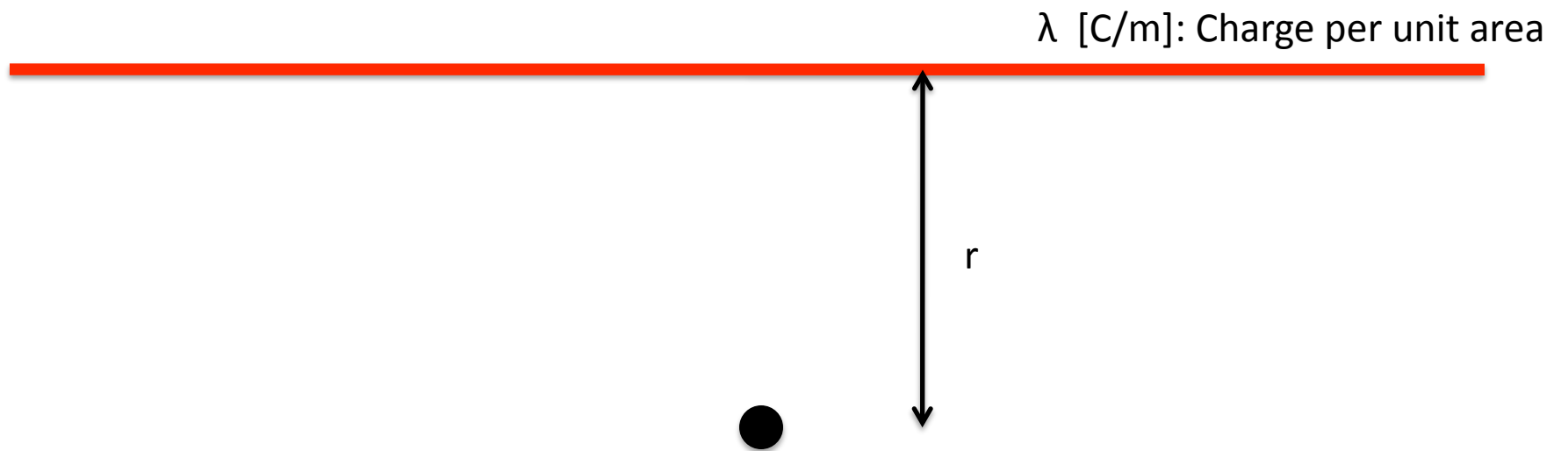Question 1:

A constant electric field $\mathbf{E} = 100\dfrac{N}{C}\hat{\mathbf{i}}$ is present throughout a region of space that includes the plane bounded by the x and y axes and the lines $x = 30$cm and $y = 50$cm. The electric flux at the plane's surface, in N/C, is

A. 0

B. 0.25

C. 25

D. 50

E. 100

Application of Gauss's Law

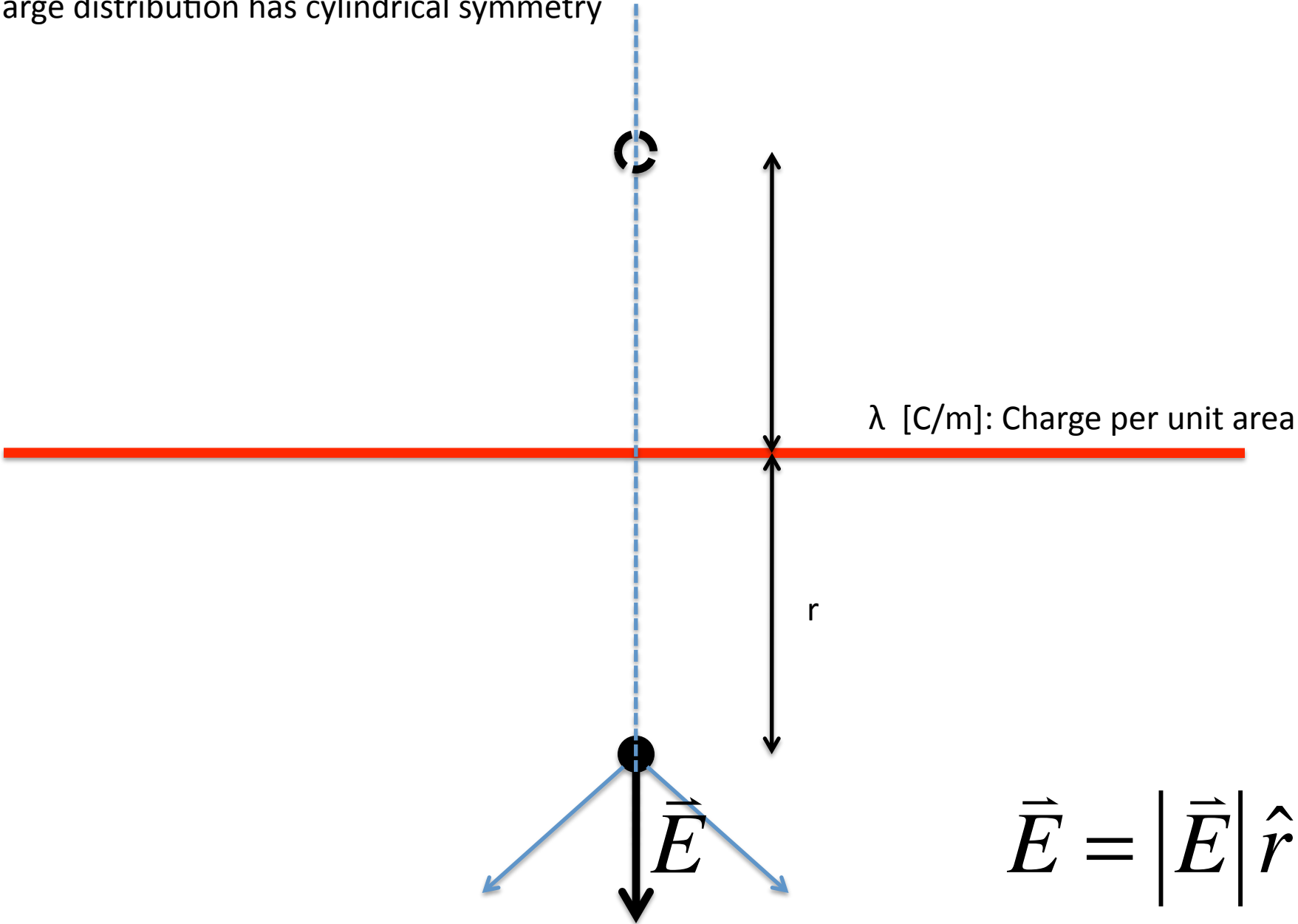Infinite uniformly charged line

λ [C/m]: Charge per unit area

r

Application of Gauss's Law

Charge distribution has cylindrical symmetry

λ [C/m]: Charge per unit area

r

$\vec{E}$

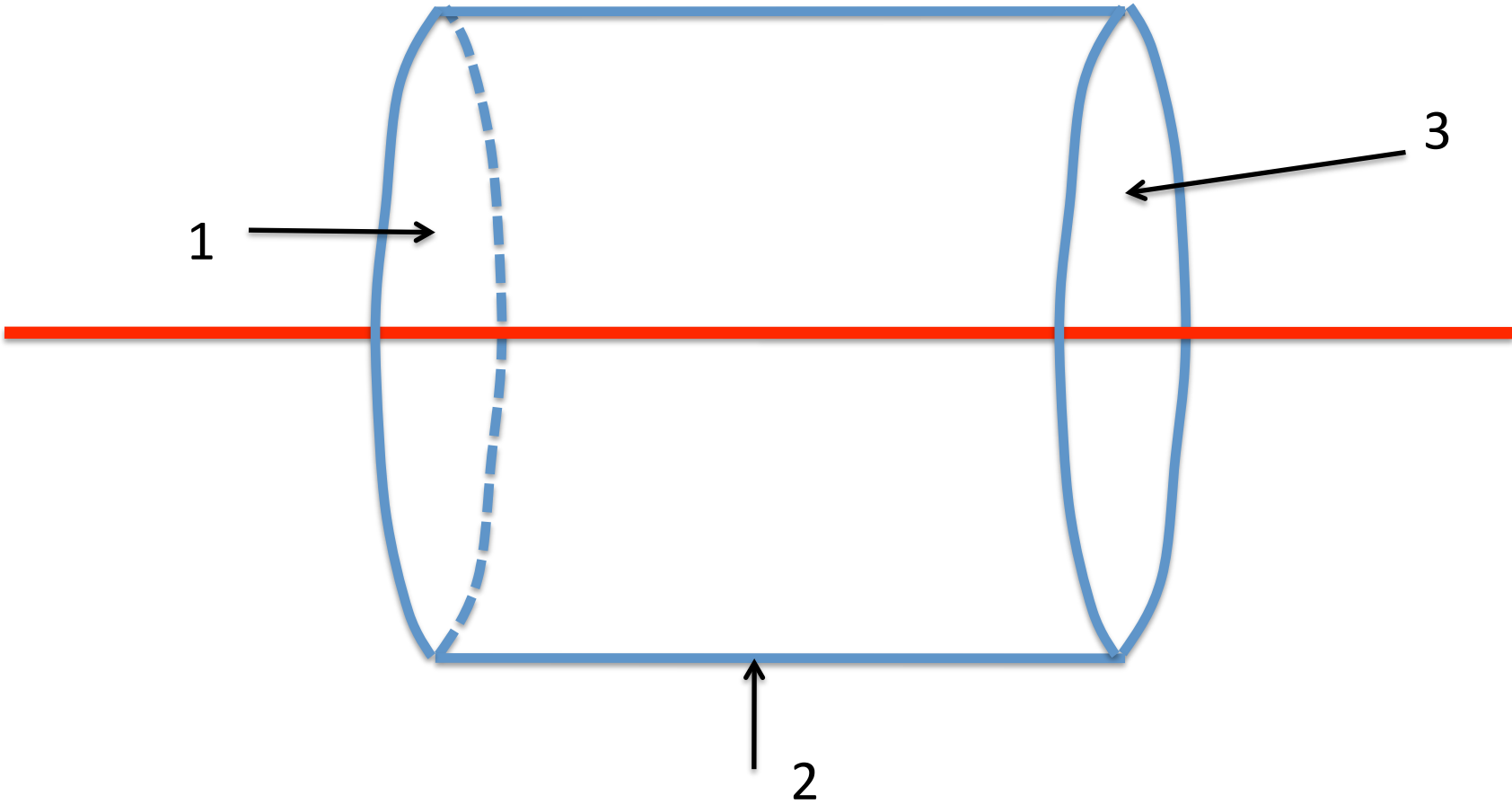$$\vec{E} = \left| \vec{E} \right| \hat{r}$$

Step 1: Define surface such that

    1) $\vec{E} \bullet \hat{n}$ is constant through out the surface

Or   2) $\vec{E} \bullet \hat{n}$ is zero through out the surface

Surfaces 1 and 3

1

3

2
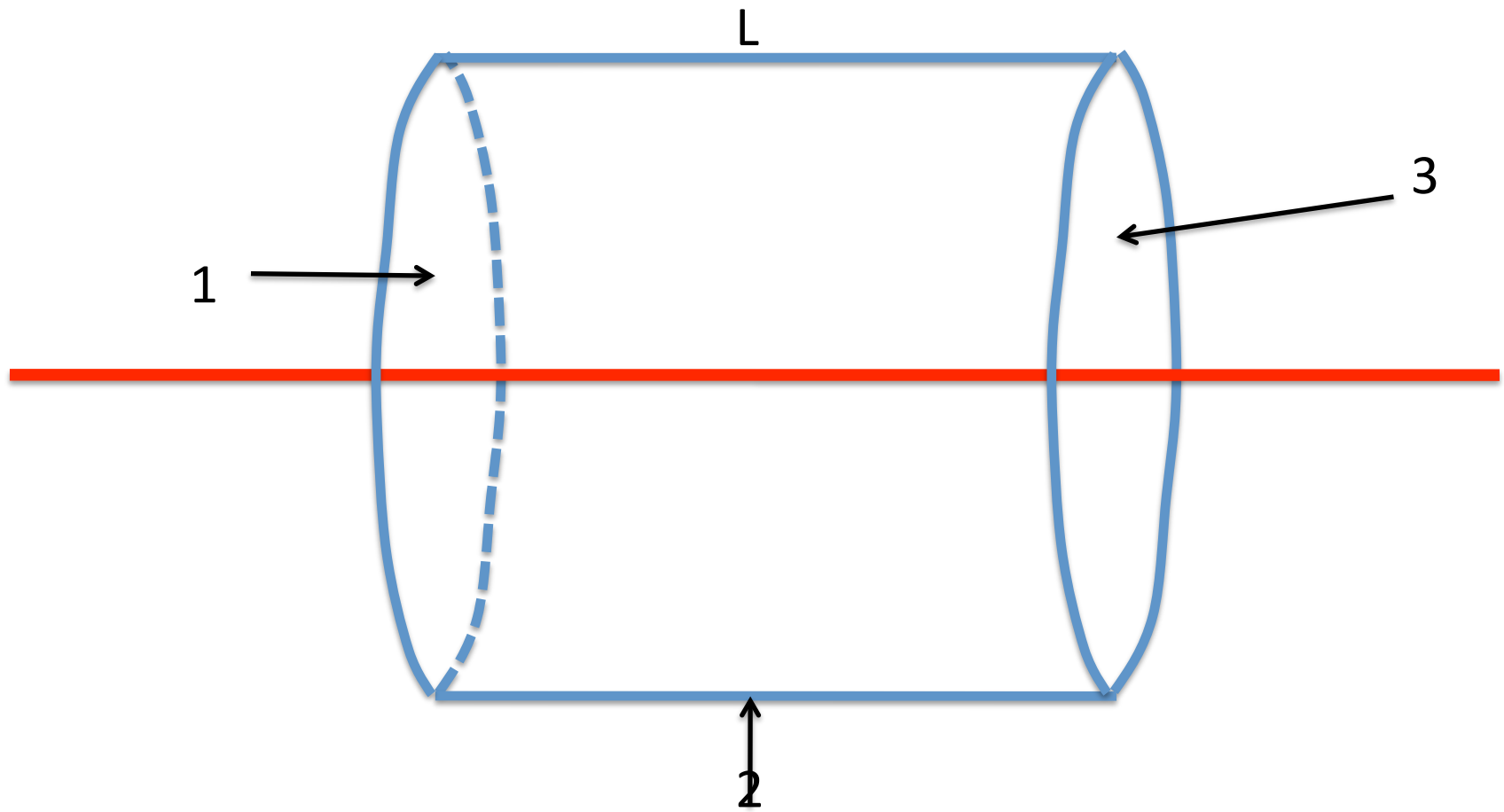
Electric field is always parallel to the surface

Flux through these surfaces are zero